

- 
- **Vasu Pai** FRACS, MCh, MS, Nat Board
 - **Ortho Surgeon**
 - **Gisborne**

FRACTURE MANAGEMENT

- I Simple closed fracture : Complete or Incomplete

Stable or unstable

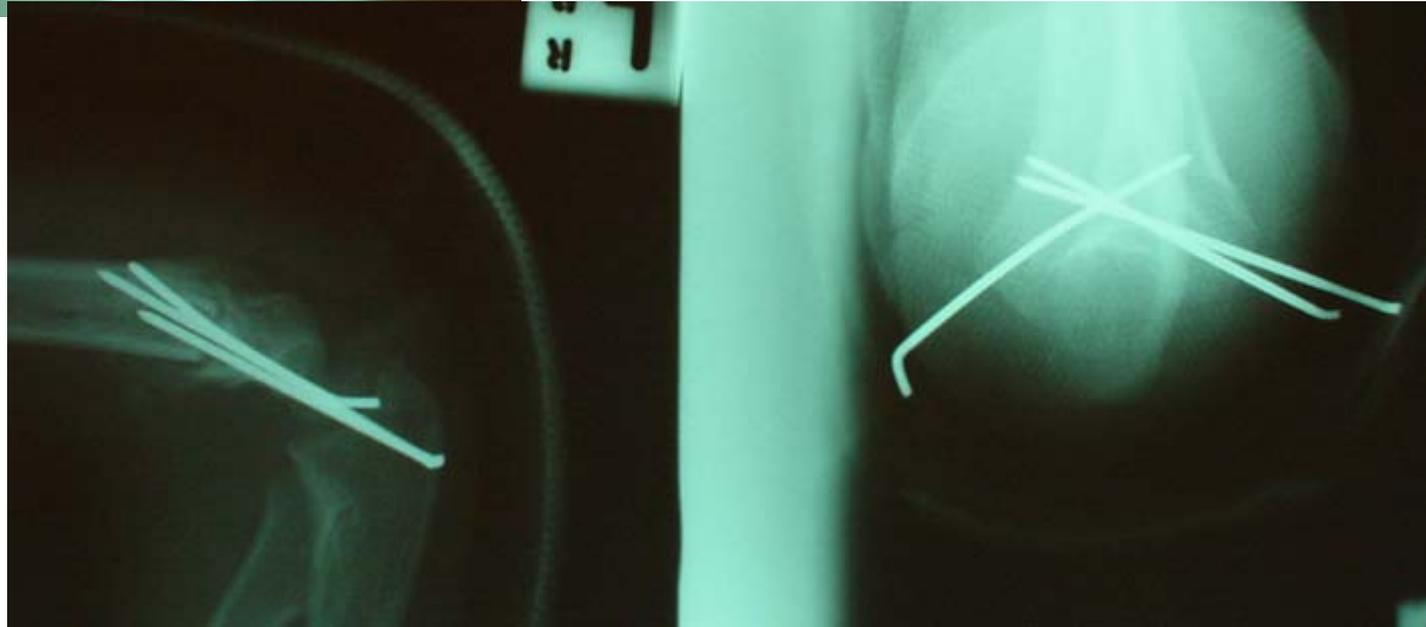
- II Open fracture
- III Multiple fracture
- IV Polytrauma

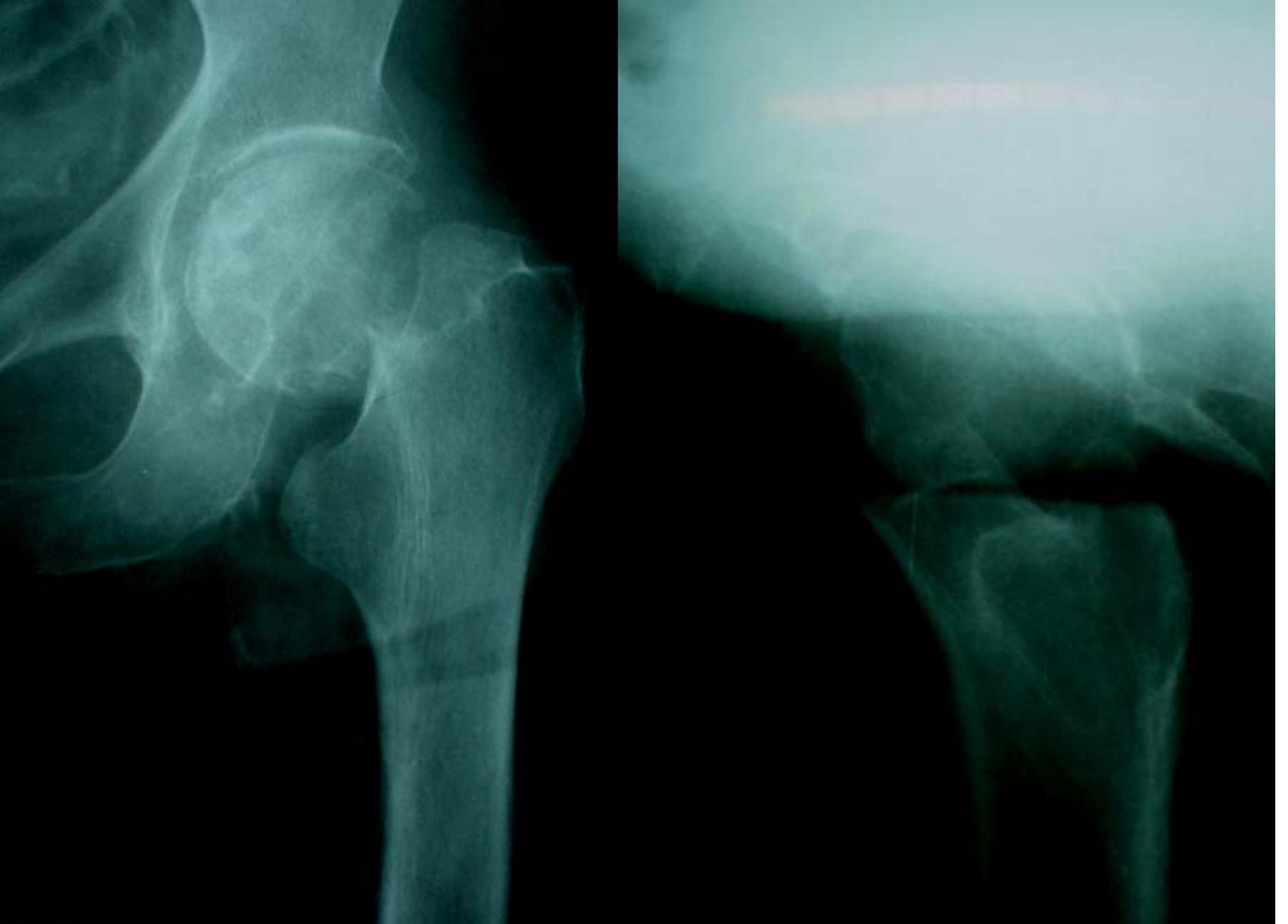
Role of traction

- Thomas splint.....Temporary splinting
- Bohler's splint.....Elevation of leg

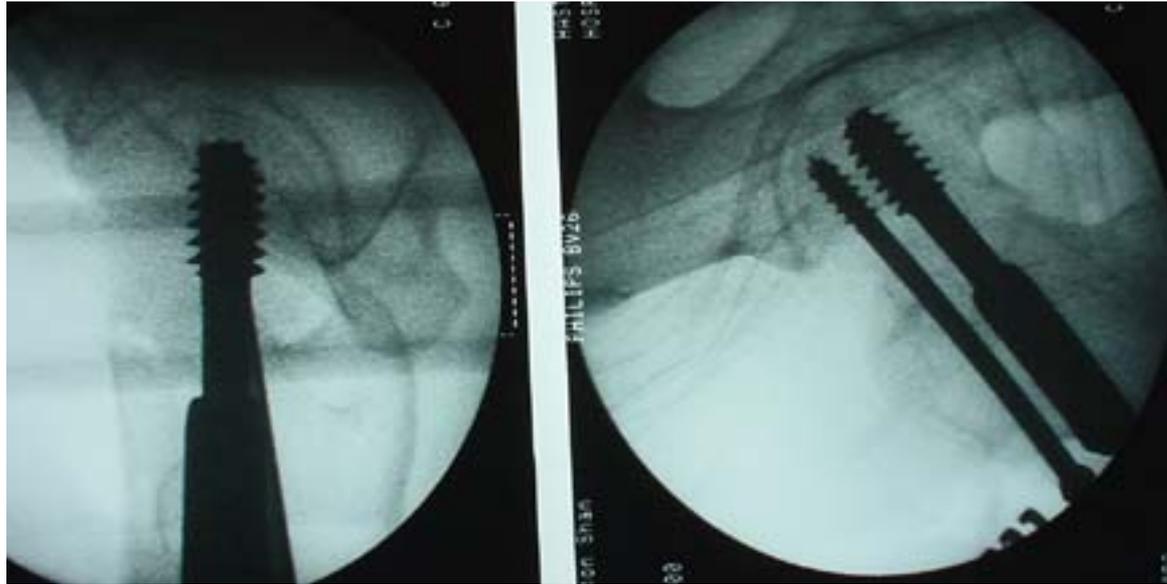
- Plaster of Paris... Cast in acute fractures
- Fibre glass cast after 10 days

Type III Supracondylar # Humerus

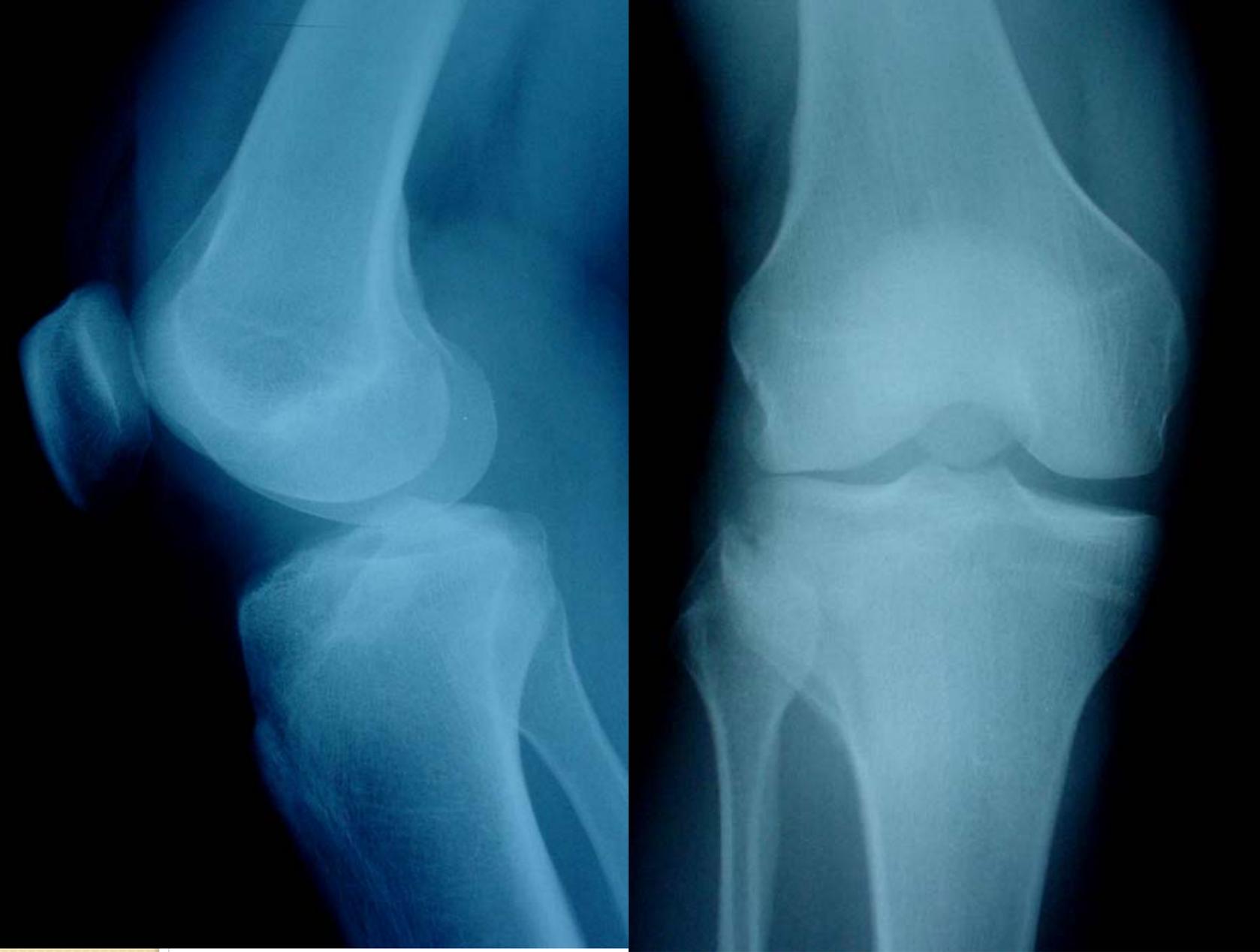




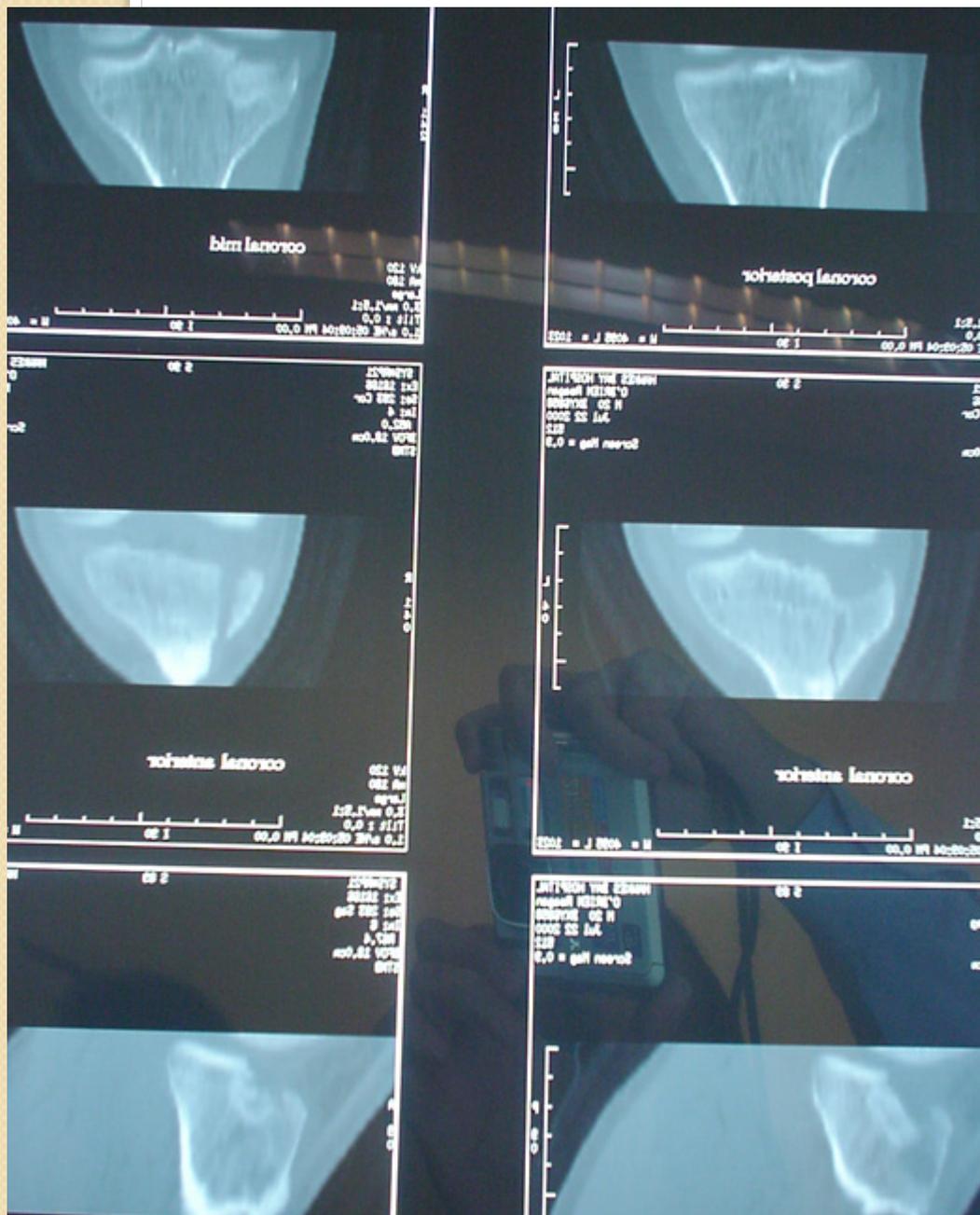
#NOF in an elderly person



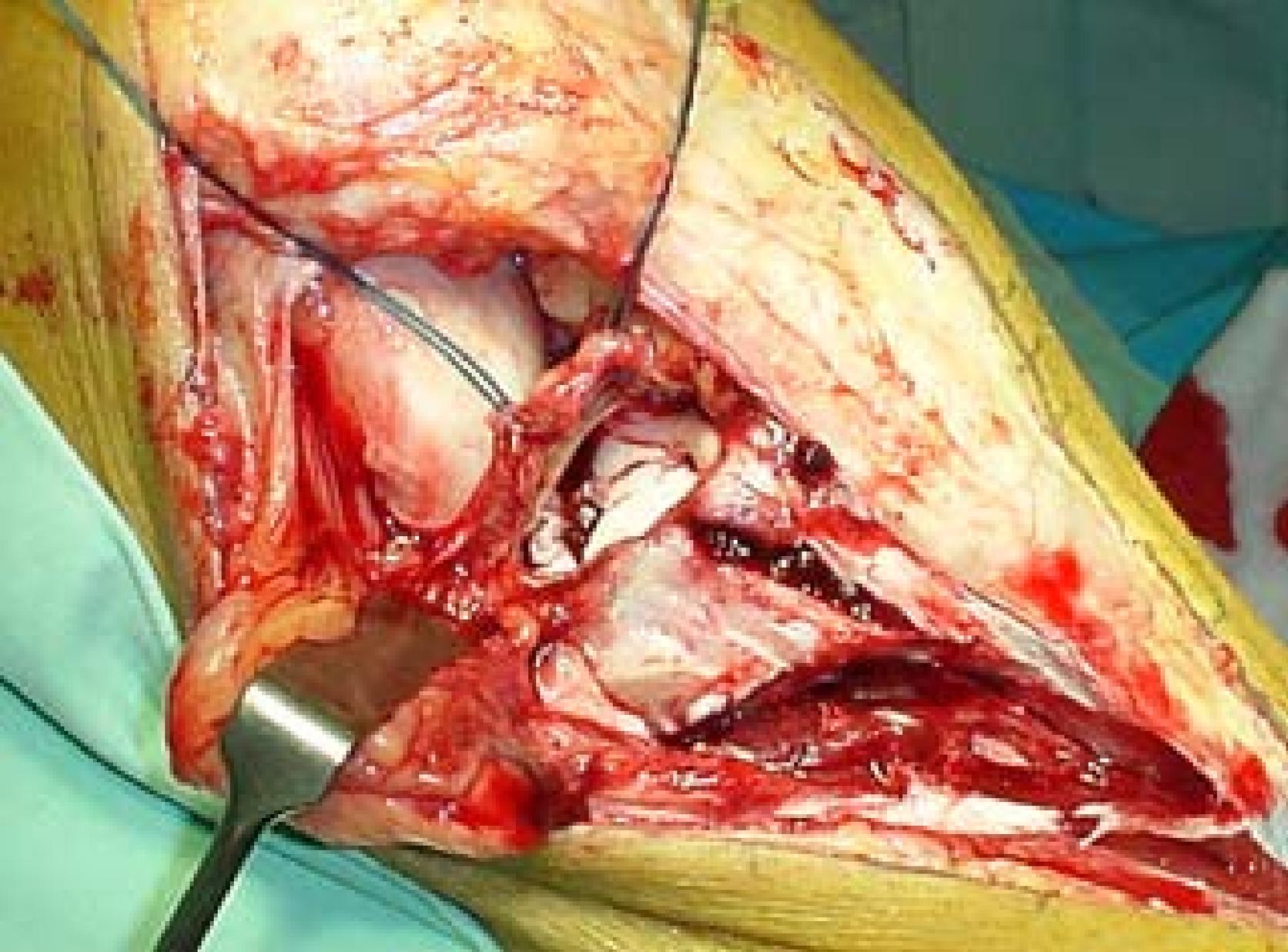
DHS with Cannulated screw fixation



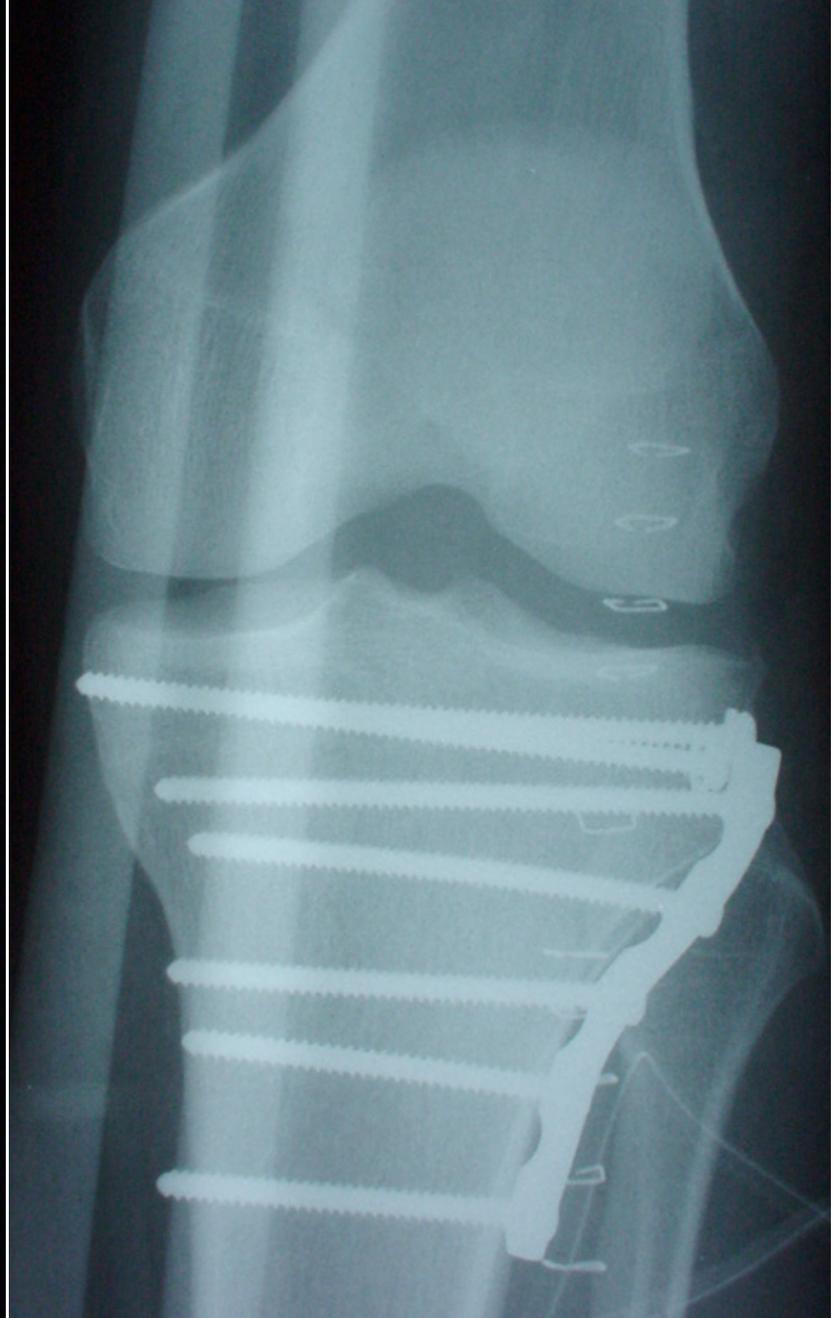
Split depression # of Lateral tibial plateau



Depression of the
fragment



Extent of intra/extra articular #



3.5 Small fragment DCP with long screws



Maurice Muller

Martin Allgower

Hans Robert Willenegger



AO Principle 1958 (Algower, Muller, Willeneger) **The AO center in Davos, Switzerland**

- Anatomic open reduction
- Stable fixation
- Meticulous surgical technique
- Early mobilization
- Reudi (AO): 97% Union and 1% Inf.
- Others: 20- 40% Delayed or Nonunion
- 6-10 Infection



Fixation

- Plating is a good procedure for NWB bones:
Humerus, Radius & Ulna.
- Tibia and femoral shaft: IM Rodding

Intramedullary rodding



Patient on the traction table





**RETROGRADE
NAIL WITH
SPIRAL BLADE
FIXATION**

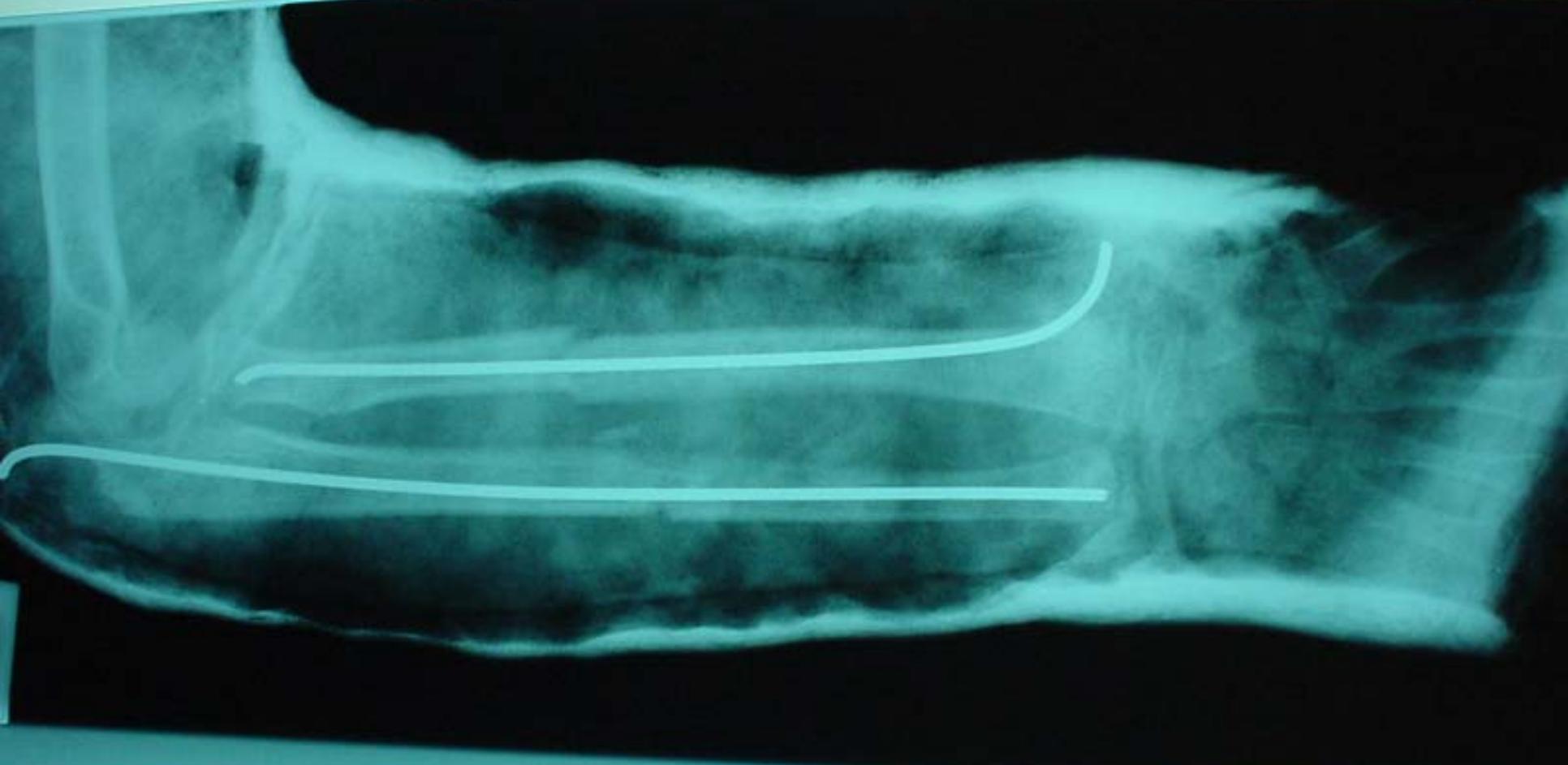
Intramedullary rod fixation

- Closed Intramedullary rods
Gold standard for diaphyseal fractures of femur & tibia.
- 83 cases : Nonunion rate is 5% and 80% of cases healed in 3 months. 95% had good to excellent results at one year

Pai 1998



HORIZONTAL
RAY



VIDEAN, GRACE
07/03/00
LSY4947
HC00128
Hawkes Bay Hospital
Health Care Hawkes Bay Ltd

Preop X ray Tibia



***50 Y ; Female**

***Tripped on the steps
(24/1/99)**

Post operative X rays: ORIF 27/1/99- Classic AO fixation



4 months: Plate removed for infection



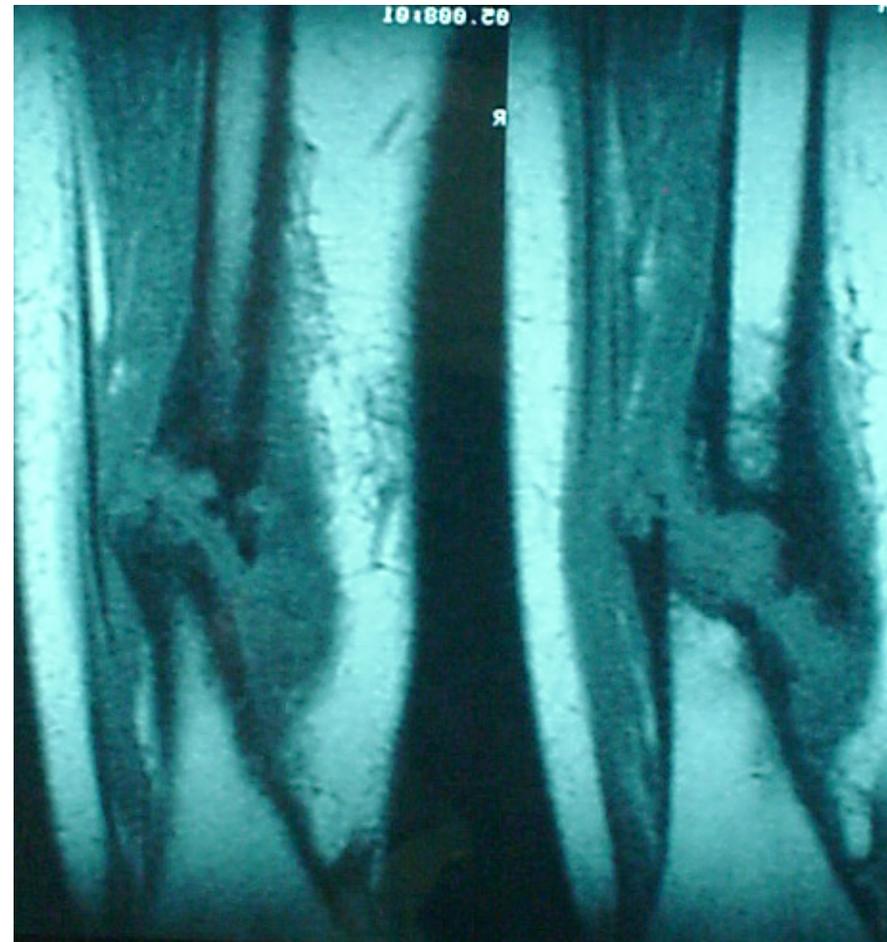
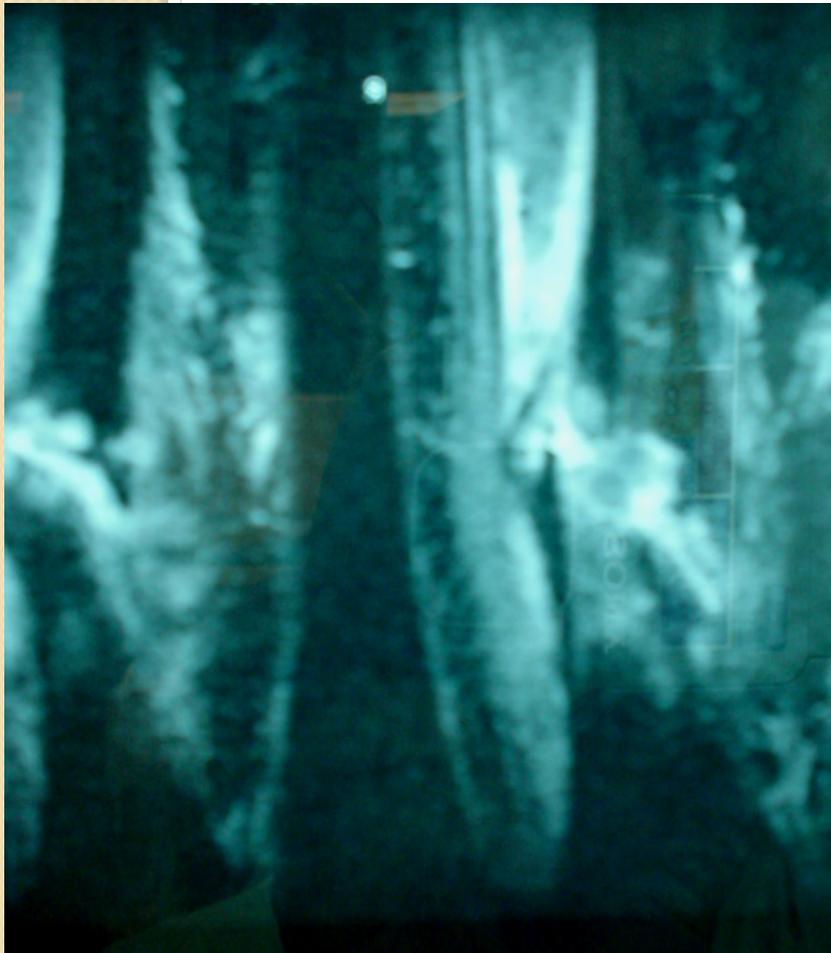


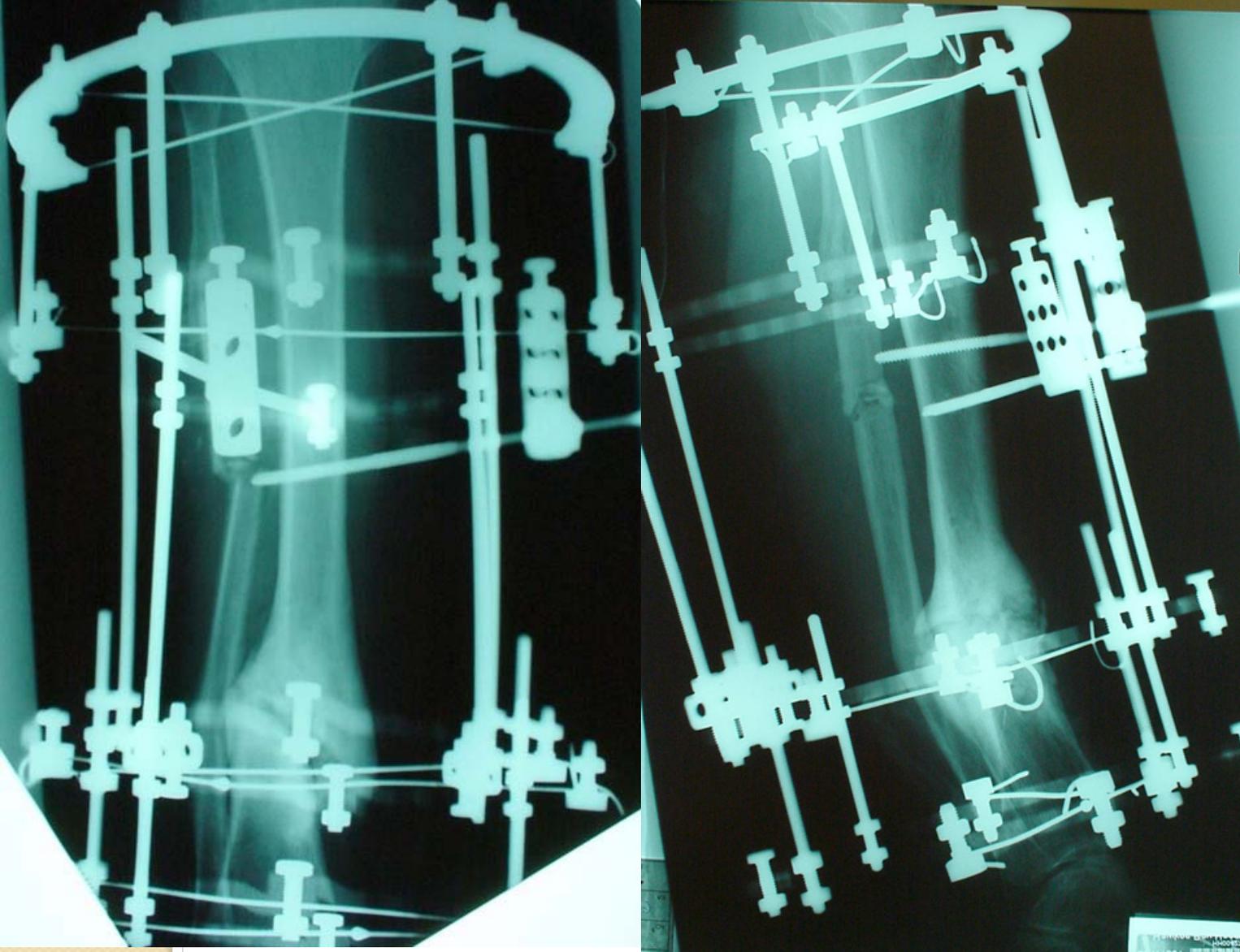
Established Non-Union (24/8/00)

**2 cm shortening; 30* Varus
angulation and 20* anterior
angulation**

**Ankle and subtalar: 70% of
normal movement**

MRI examination: Frank Non-union





Sept 00: Ilizarov' ring external fixation

Classic fixation Vs Biologic fixation

- Small skin incision
- Less dissection
- Minimal vascular damage

“Early healing and high rate of union
Reduces infection rate”

Havranek. Rozhl Chir 76: 359-63



Skin incision at medial malleolus

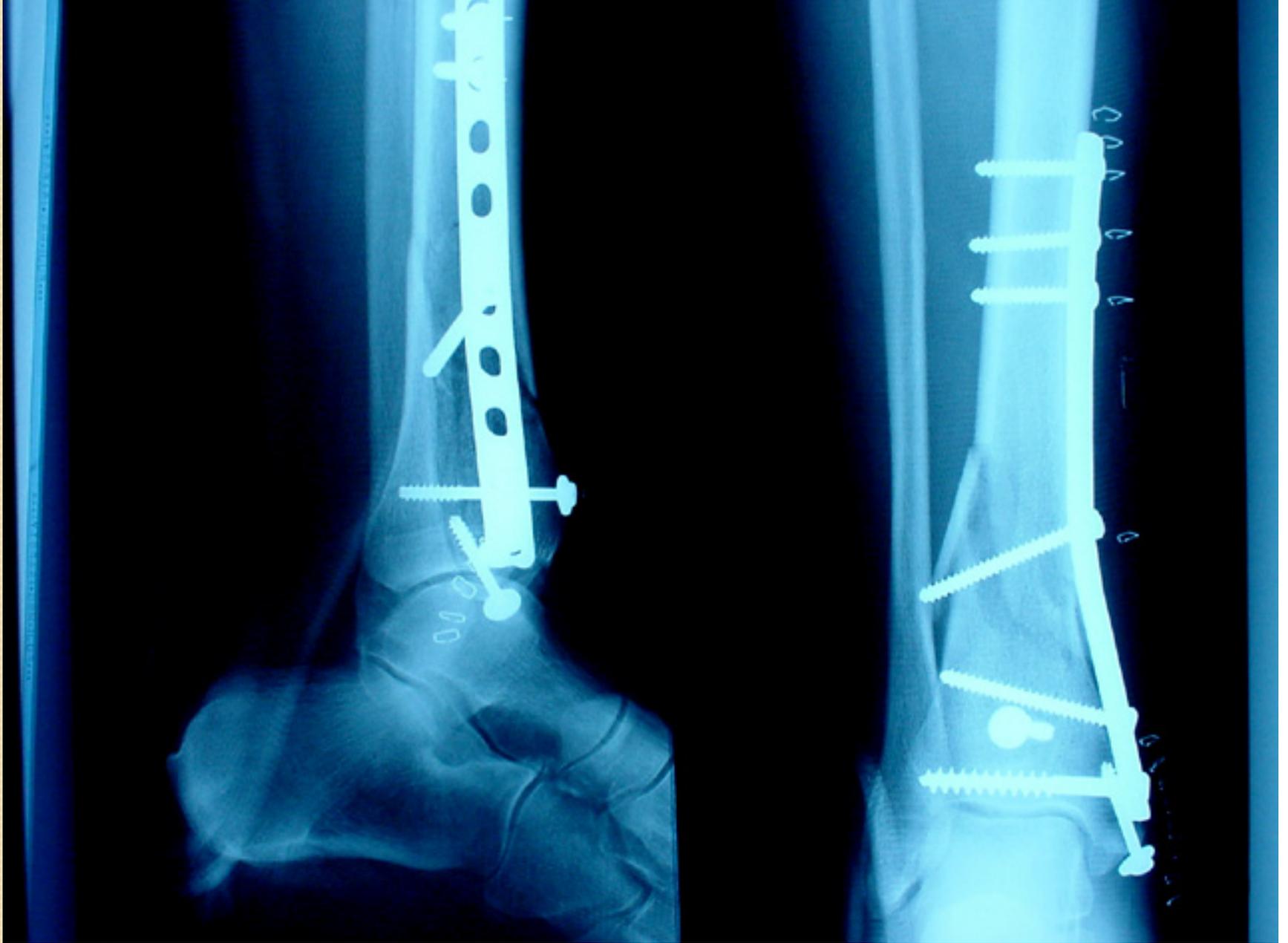
Pai Int Orthop 2007



Tunnel is created



Plate passed subcutaneous tissue



IMMEDIATE POST OP







Open fracture Gustillo & Anderson Grading

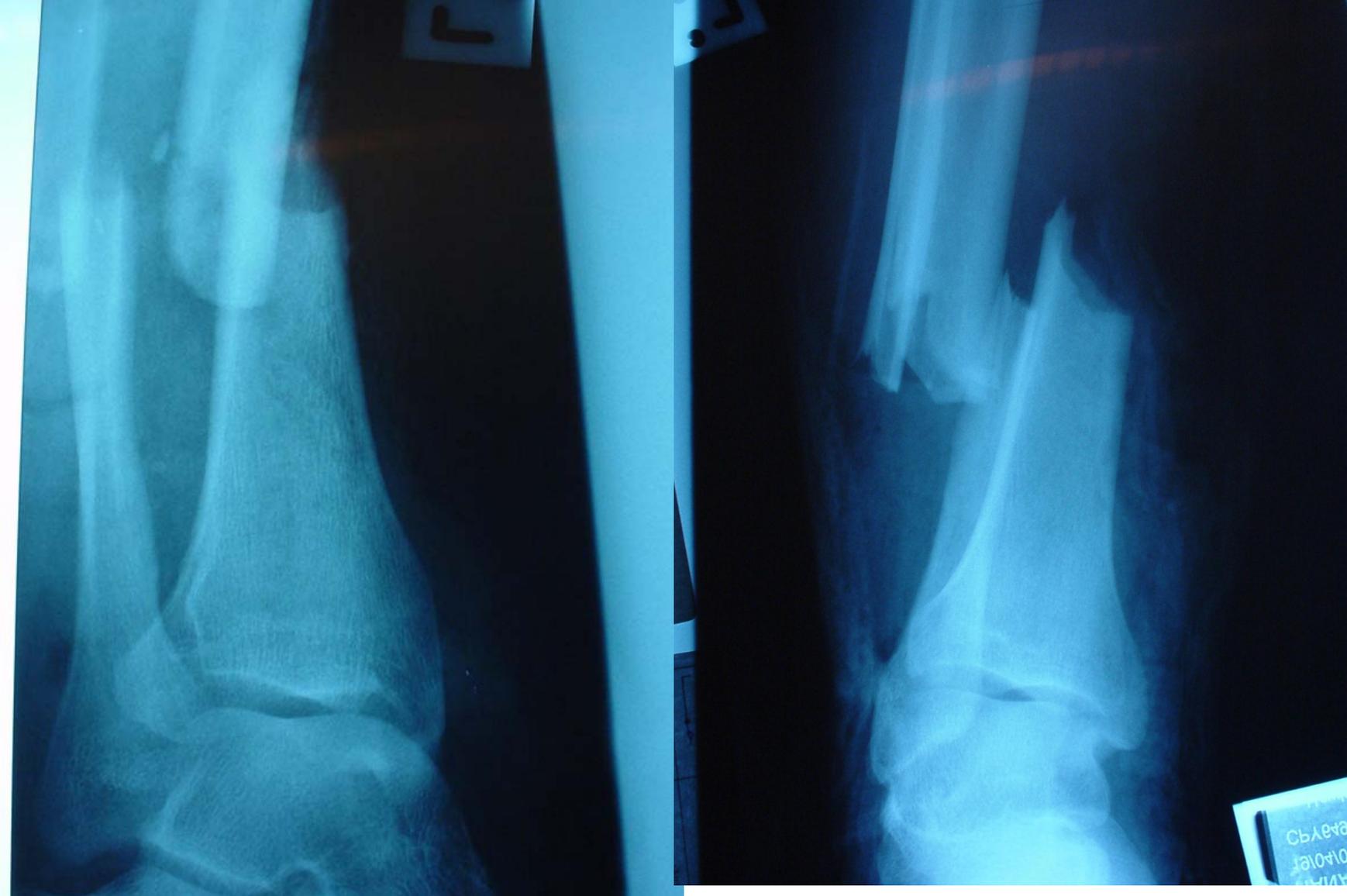
- I: <1cm ; Low energy;No soft tissue crush
- II: 1-10cm; Low energy;Minimal STC
- III:High energy,comminution,Significant STC
 - a) Periosteum intact
 - b) Periosteum stripped
 - c) Vascular injury

Open fracture: Treatment

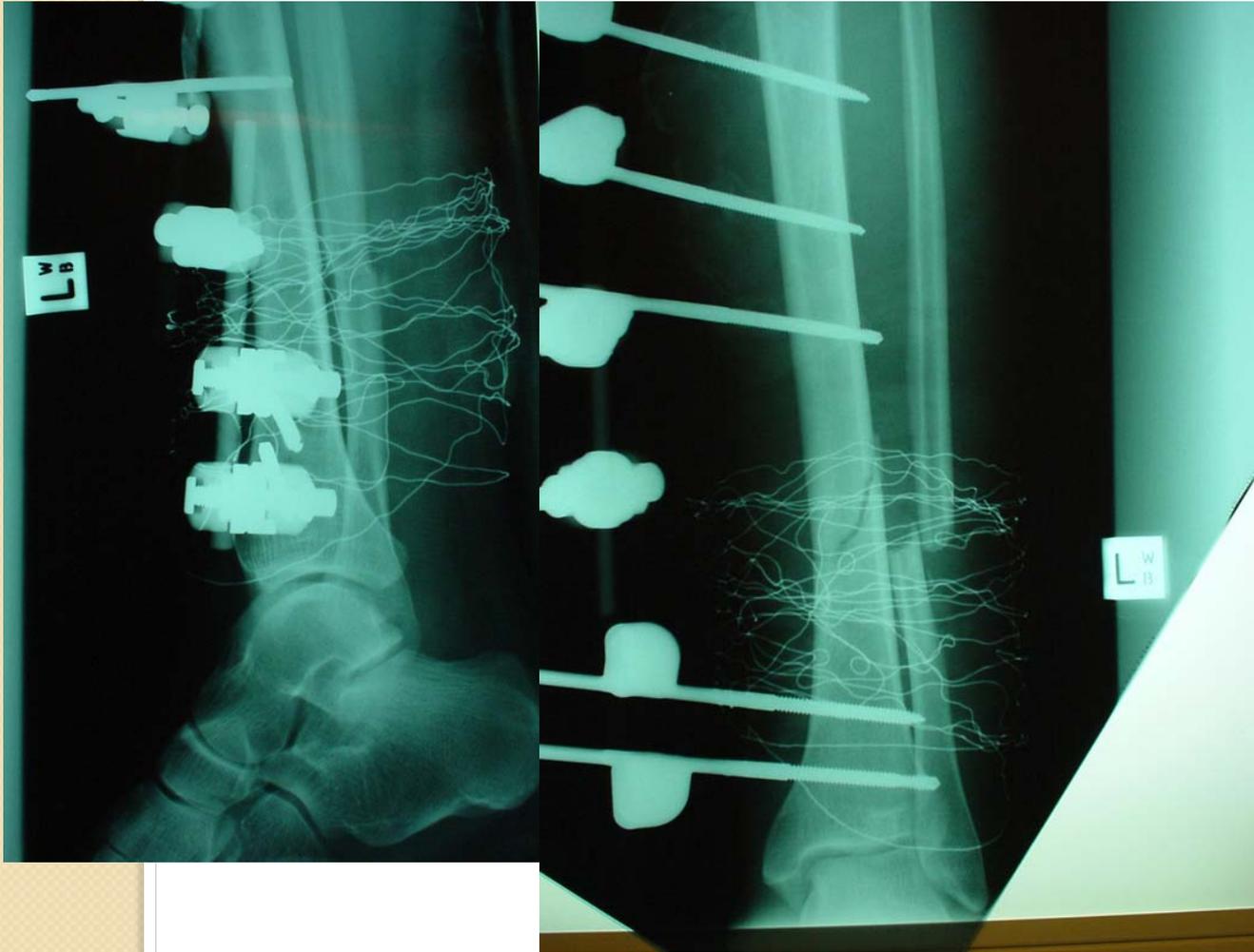
- Antibiotic, tetanus; splint, dressing
- Wound debridement and stabilisation
+/- fasciotomy; Always: Wound open
- Repeated debridement
- Skin coverage



Type IIIa fracture tibia



Fracture at Middle with distal 1/3rd tibia



Fracture fixed with Hoffmans fixator



Rxed with EF and healed well at
6 months

Bilateral multiple feet



Bilateral segmental comminuted

L Open # femur

R closed comminuted fracture



Open type III fracture



Grossly comminuted # distal radius



R tibial plateau Bicondylar



Gardens III (R) & Post Dislocation L



C4-5 instability













Polytrauma : 4 periods:

1. Resuscitation period (0-3 hrs)

2. Primary stabilization period(3-72 hrs):

“Day-one surgery is performed”

3. Secondary period (3-8 days)

4. Tertiary or rehabilitation period (>8 days)

Acute period (< 3hrs)

***Circulation/Airway stabilization**

***Decompression of Organ cavities**

***Hemorrhage control**

****Pelvic clamp: 3% life threatening is due to H'ge from Pelvis alone***

Head Injury & Timing of skeletal fixation

? Early or Delayed

“Advantages of early fixation”

- Reduces the complications of traction & Recumbency
- Reduces pain and decreases stimulus for a systemic inflammatory response
- Easy nursing care
- Fracture outcome is better
- Decreases health care costs

Schmeling Clin Orthop 318: 106-16

? Safe

In patients with head injury, if hypotension and hypoxia are avoided, early fixation of long bone fractures does not increase the incidence of adverse cerebral complications

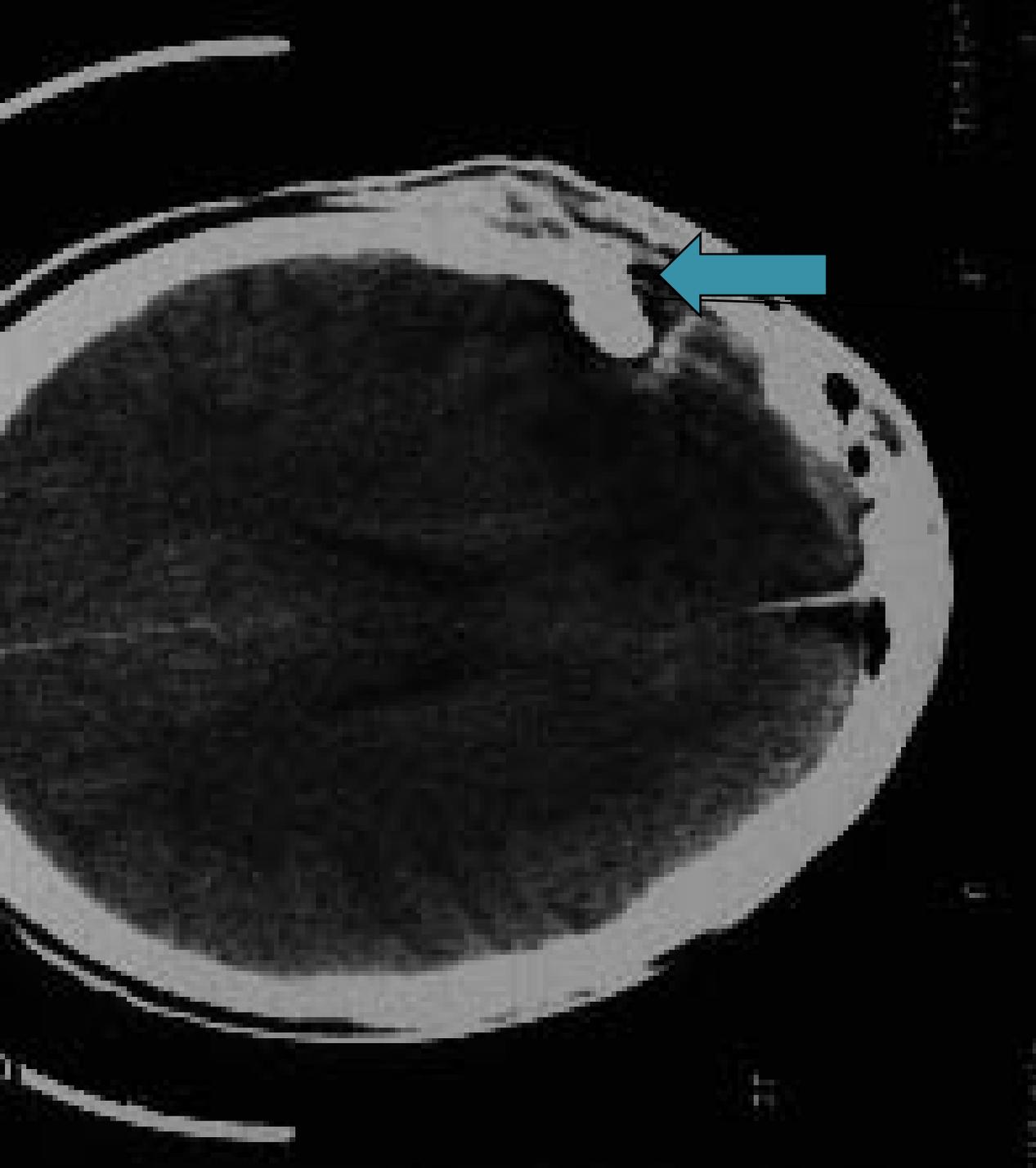
Surgical shock

- Not always represented by BP & Pulse
- Immediate crystalloid => Blood
- Platelets when < 50000
- Frozen plasma: Hypofibrinogenaemia, Factor V and VIII

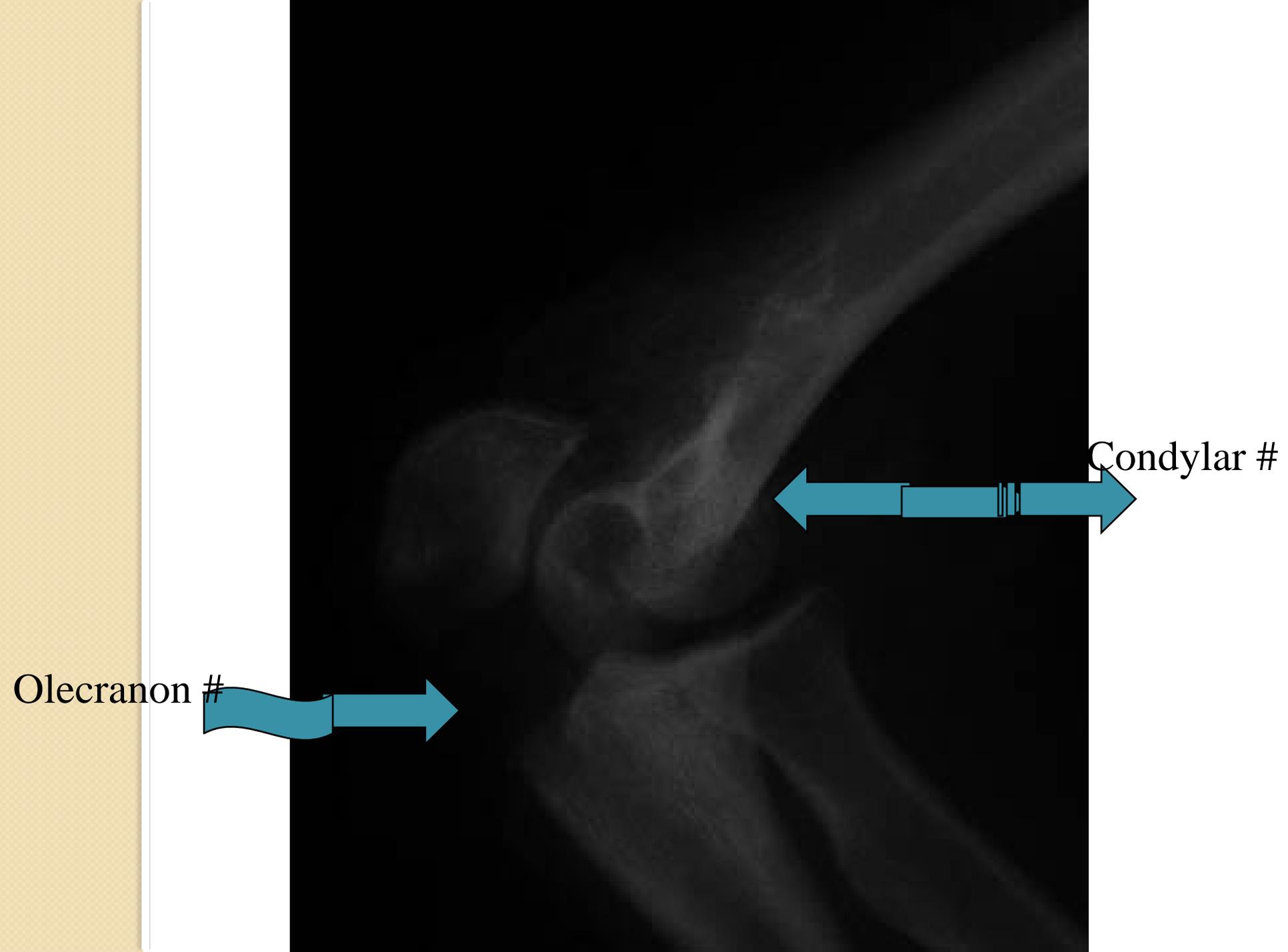
PRIORITIES: MUSCULOSKELETAL INJURY IN

POLYTRAUMA

1. Concomittant vascular injury
2. Compartment syndrome
3. Open fracture
4. Closed fracture



Depressed # skull



Olecranon #



Condylar #





Comminuted fracture femur (Closed)

Orthopaedic management:

I Vascular injury

II Compartment syndrome

III Open fracture

IV Closed fracture

V Joint fractures

Priority of musculo-skeletal surgery

***Limb salvage Vs Amputation:**

Mangled Extremity Scores:

Shock

Vascularity and Neurology

Extent of injury

Age





Biodegradable rods

Lateral condylar fracture





Lateral condyle fracture: at 3 wks

Hybrid external fixator

Indication: Complex fracture of proximal and distal tibia

Wire fixation for the comminuted fragments and pins for the normal bone

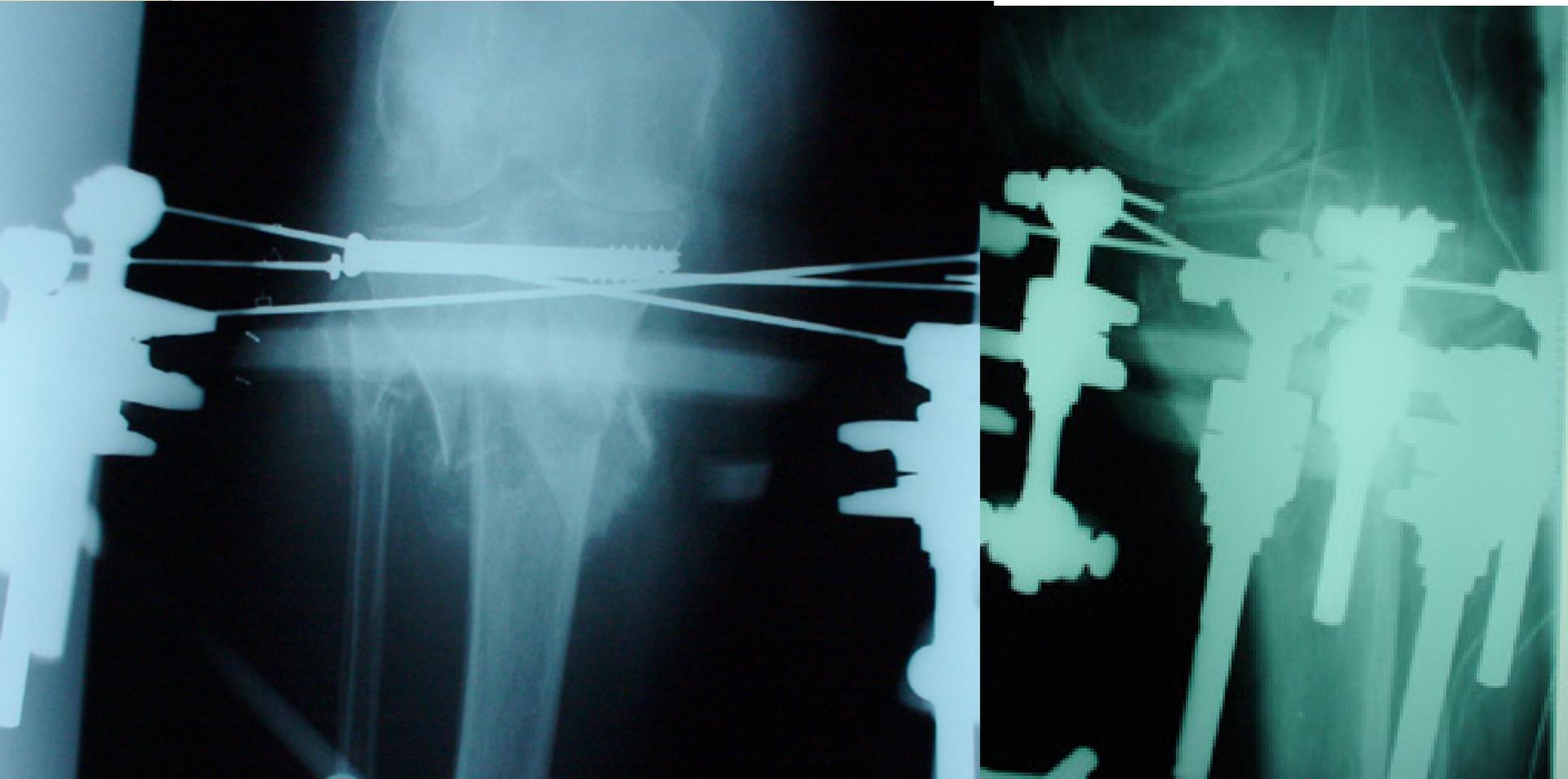


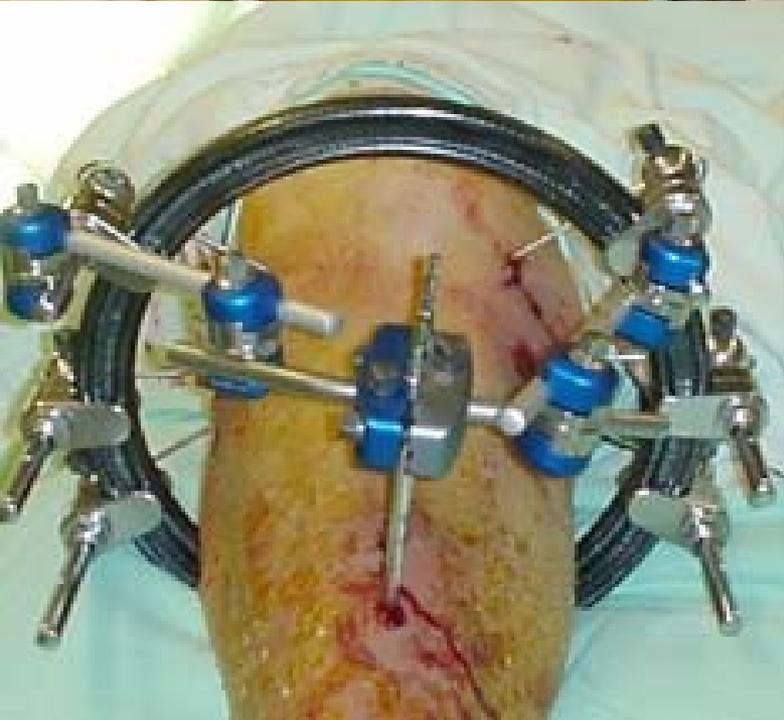
fixed with Wires;



Replaced with Biodegradable rods

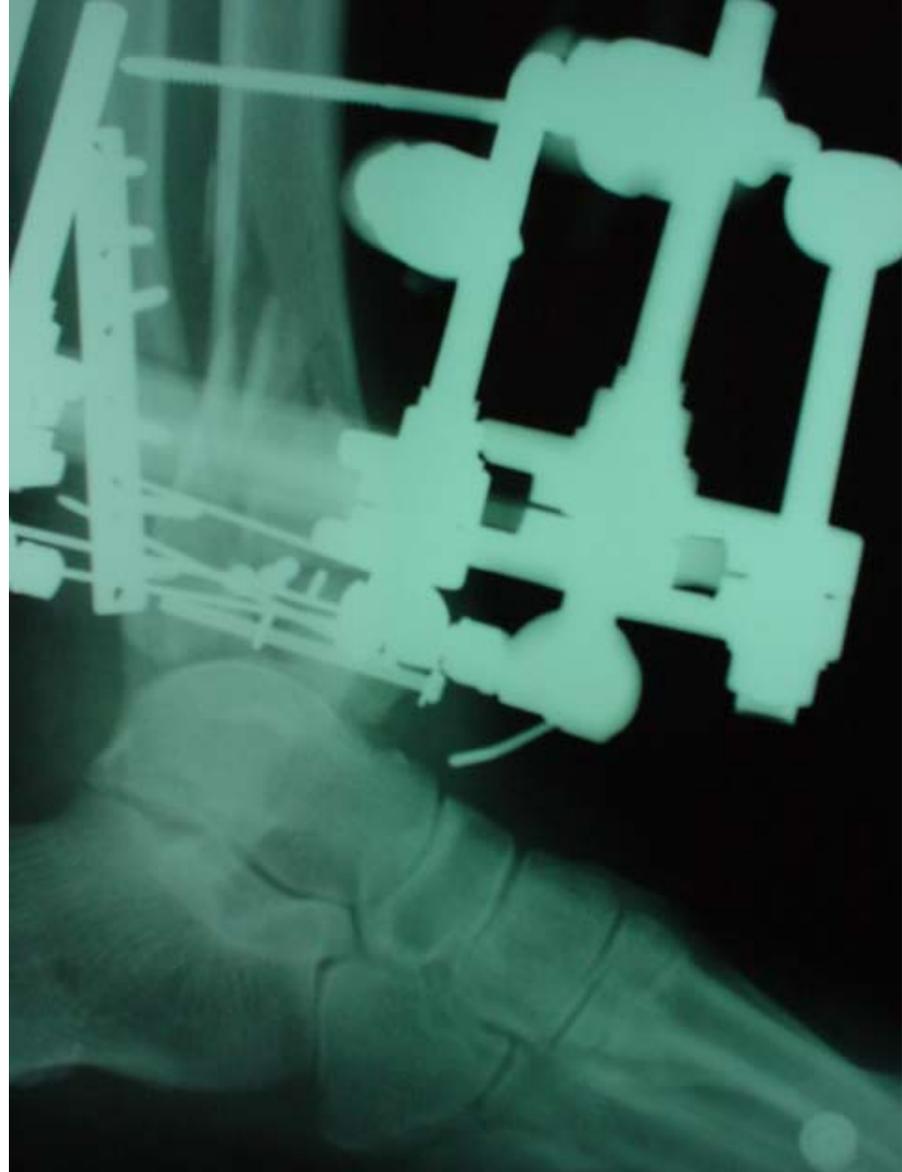
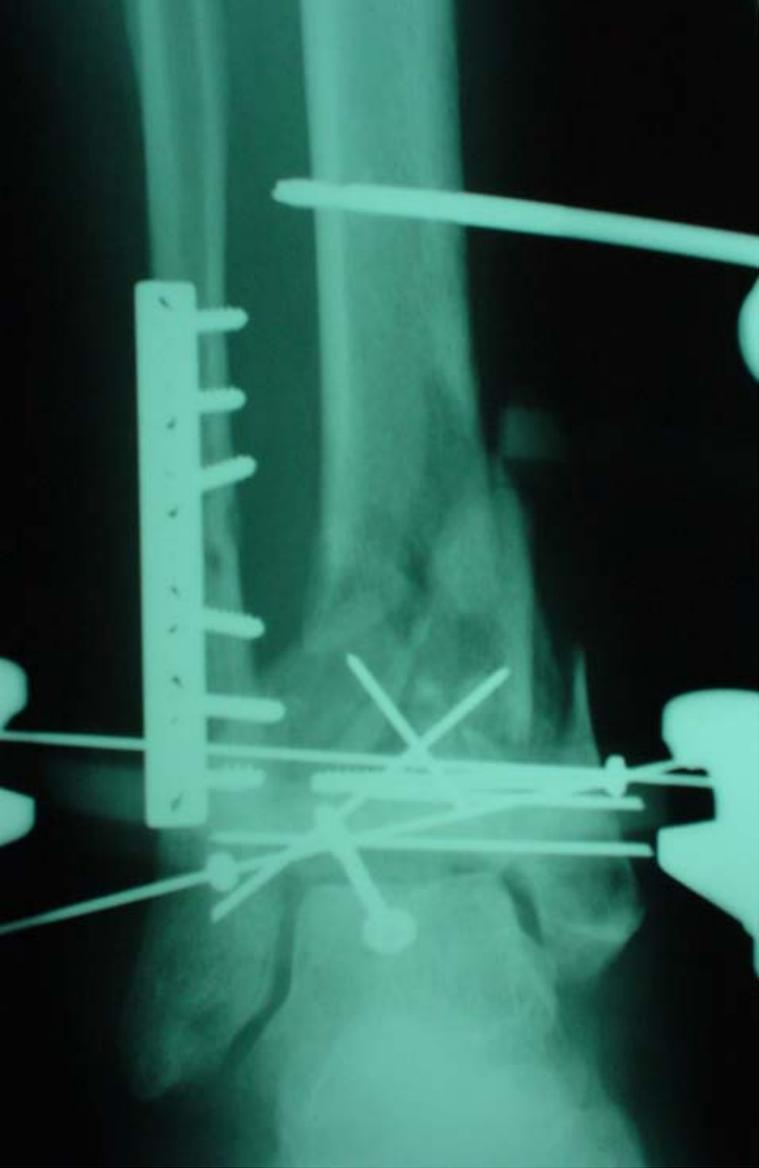
Post Op X rays: At 2 wks of EF : evidence of early healing by callus formation







Badly comminuted fracture distal end of tibia



Hybrid external fixator for intra-articular fracture of distal tibia

SUMMARY

- Management depends on Fracture morphology. No single method is applicable for all fractures
- Open fracture is surgical emergency. Early debridement and fixation is indicated.
- Polytrauma: Prioritization is essential

- 
- Intramedullary fixation of weight bearing bone - is a gold standard for Tibia and femur
 - Minimally invasive technique is an useful technique in certain fractures
 - Use of Biodegradable rods useful in children

- 
- Anatomical reduction is not always necessary. Alignment is more important.

Thank you